AMENDMENTS TO THE CLAIMS

Upon entry of this amendment, the following listing of claims will replace all prior versions and listings of claims in the pending application.

IN THE CLAIMS

Please amend the pending claims as follows:

1. (currently amended) A method of processing and interpreting seismic data, comprising:

identifying a plurality of extrema positions with sub-sample precision associated with said seismic data;

deriving coefficients that characterize the seismic data waveform, ~~from a single extrema data point,~~ in the vicinity of said extrema positions wherein said derived coefficients are derived from a single extrema data point; and

forming groups of said extrema positions using a Gaussian statistical model, wherein said coefficients that characterize the seismic data waveform are similar.

2. (cancelled)

3. (original) A method according to claim 1, wherein said coefficients are derivatives.

4. (original) A method according to claim 3, wherein said derivatives are determined using orthogonal polynomials and said derivatives allow local reconstructions of seismic traces in the vicinity of said extrema positions to be obtained using Taylor series expansions.

5. (original) A method according to claim 1, wherein said seismic data is subjected to orthogonal polynomial spectral decomposition and said extrema positions are identified based on said decomposed seismic data.

6. (original) A method according to claim 5, wherein said orthogonal polynomial spectral decomposition comprises volume reflection spectral decomposition with Chebyshev polynomials used as the basis functions.

7. (currently amended) A method according to claim 1, wherein said process of forming groups of said extrema positions ~~utilizes~~ utilizing a statistical model further assumes that coefficient attribute vectors have a Gaussian distributions with separate parameters for each group.

8. (previously presented) A method according to claim 1, wherein said groups of extrema positions are further formed using supervised classification.

9. (original) A method according to claim 8, wherein seed points for said supervised classification are picked by a user.

10. (previously presented) A method according to claim 1, wherein said groups of extrema positions are further formed using unsupervised classification.

11. (original) A method according to claim 10, wherein a number of classes for said unsupervised classification is provided by a user.

12. (original) A method according to claim 10, wherein seed points for said unsupervised classification are selected at random and small spatially contiguous horizon segments are extracted locally around said seed points.

13. (original) A method according to claim 1, further including defining a volume of interest within said seismic data.

14. (original) A method according to claim 13, wherein said volume of interest comprises a vertical window of constant thickness or a volume between two pre-interpreted seismic horizons.

15. (original) A method according to claim 1, wherein horizon segments are extracted on opposite sides of input fault surfaces.

16. (original) A method according to claim 15, wherein fault displacement estimates are determined using said extracted horizon estimates.

17. (original) A method according to claim 16, wherein said fault displacement estimates are decomposed into vertical throw and horizontal heave components.

18. (original) A method according to claim 1, wherein said groups of extrema positions are used to create a horizon interpretation.

19. (original) A method according to claim 1, wherein said groups of extrema positions are used to extract a seismic volume containing multiple reflectors having similar seismic response.

20. (currently amended) A computer system for processing and interpreting seismic data, comprising:

(a) means for identifying a plurality of extrema positions ,with sub-sample precision, associated with said seismic data;

(b) means for deriving coefficients ~~from a single extrema data point~~ that characterize the seismic data waveform in the vicinity of said extrema positions wherein said coefficients are derived from a single extrema data point; and

(c) means for forming groups of said extrema positions using a Gaussian statistical model, wherein said coefficients that characterize the seismic data waveform are similar.

21. (currently amended) A computer program product for processing and interpreting seismic data, comprising:

a computer useable medium having computer readable program code embodied in said medium for processing seismic data, said computer program product having:

(a) computer readable program code means for identifying a plurality of extrema positions associated with said seismic data with sub-sample precision;

(c) computer readable program code means for deriving coefficients from a single extrema data point that characterize the seismic data waveform in the vicinity of said extrema positions; and

(c) computer readable program code means for forming groups of said extrema positions using a Gaussian statistical model, wherein said coefficients that characterize the seismic data are similar.

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